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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

PARK, EDWARD

ART UNIT

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2624

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/809,464	Applicant(s) OKUDA ET AL.	
	Examiner EDWARD PARK	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 14 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 26-29 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 26-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/14/09 has been entered.

Response to Arguments

2. Applicant's arguments filed on 5/14/09, in regards to claim 1, have been fully considered but they are not persuasive. Applicant argues that Ko does not disclose the newly added limitation, wherein the rule-based classification and learning type classification are present in a parallel relationship with each other and independent of each other (see pg. 8, last paragraph). This argument is not considered persuasive since the Ko reference discloses this limitation within pg. 94, left column, first paragraph, where applied both an adaptive learning mechanism and a supervised learning technique to the LVQ algorithm. The adaptive learning mechanism can ... After the learning procedure, a supervised learning method can... Examiner notes that the term parallel relationship is interpreted as a relationship between the two techniques where the execution/processing of the techniques do not coincide with each other as further clarified with the limitation, independent. The rejection for claim 1 can be seen below.

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Regarding claims 2-6, applicant argues that the claims are allowable due to the same reasons as stated within claim 1 (see pg. 9, first paragraph). This argument is not considered persuasive since claim 1 stands rejected and the arguments and rejection can be seen within this action.

Regarding claim 26, applicant argues that the claim is allowable due to the same reasons as stated within claim 1 (see pg. 9, second paragraph – pg. 10, first paragraph). This argument is not considered persuasive since claim 1 stands rejected and the arguments and rejection can be seen within this action.

Regarding claims 27-29, applicant argues that the claims are allowable due to the same reasons as stated within claim 26 (see pg. 10, third paragraph). This argument is not considered persuasive since claim 26 stands rejected and the arguments and rejection can be seen within this action.

Regarding claims 2, 3, 6, 28, 29, applicant argues the claims are allowable due to the dependency from claims 1, 26 and for the same reasons as stated within claims 1, 26 (see pg. 10, fourth paragraph). This argument is not considered persuasive since claims 1, 26 stand rejected and the arguments and rejections can be seen within this action.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-6 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. The Federal Circuit¹, relying upon Supreme Court precedent², has indicated that a statutory “process” under 35 U.S.C. 101 must (1) be tied to a particular machine or apparatus, or (2) transform a particular article to a different state or thing. This is referred to as the “machine or transformation test”, whereby the recitation of a particular machine or transformation of an article must impose meaningful limits on the claim's scope to impart patent-eligibility (See *Benson*, 409 U.S. at 71-72), and the involvement of the machine or transformation in the claimed process must not merely be insignificant extra-solution activity (See *Flook*, 437 U.S. at 590”). While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform an article nor are positively tied to a particular machine that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. That is, the method includes steps of obtaining, extracting, classifying, etc. is of sufficient breadth that it would be reasonably interpreted as a series of steps completely performed mentally, verbally, or without a machine. The cited claims do not positively recite any structure within the body of the claim which ties the claim to a statutory category. Furthermore, the examiner suggests that the structure needs to tie in the basic inventive concept of the application to a statutory category. Structure that ties insignificant pre or post solution activity to a statutory category is not sufficient in overcoming the 101 issue. Additionally, the limitations do not claim data that represents a physical object or substance, the data representing the physical object is not present and therefore can not be modified by the process in a meaningful or significant manner,

¹ *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

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and no meaningful and significant external, non-data depiction of a physical object or substance is produced. Thus, the limitations do not satisfy the transformation test.

¹ *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

² *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1, 4, 5, 26, 27** are rejected under 35 U.S.C. 102(b) as being anticipated by Ko et al (IEEE, “Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method”).

Regarding **claim 1**, Ko discloses a method for classifying defects, comprising:
obtaining an image of a defect on a sample (“three-color tiered illumination system ... CCD camera”; Ko: pg. 94, right column, last paragraph);

² *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v.*

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extracting a characteristic of the defect from the image (“classify solder joints by color patterns obtained from a three-tiered color circular illumination system based upon a similarity measure between input data and the feature vectors of each class”; Ko: pg. 94, left column, third paragraph);

classifying the defect in accordance with the extracted characteristic, and based on a rule-based classification and a learning type classification (see pg. 94, left column, first paragraph);

wherein the step of classifying further comprises:

calculating a set of first likelihoods of the defect belonging to each of a plurality of defect classes of the rule-based classification, by use of the extracted characteristic (see pg. 94, left column, first paragraph, unsupervised self organizing neural network such as either a learning vector quantization (LVQ) neural network which is inherently rule-based since no classification algorithm can not operate or execute without rule-based);

calculating a set of second likelihoods of the defect belonging to each of a plurality of defect classes of the learning type classification, by use of the extracted characteristic (see pg. 94, left column, first paragraph, adaptive learning mechanism can automatically select the optimal number of clusters during a learning procedure);

calculating a third set of likelihoods of the defect belonging to each of the defect classes of the learning type classification and/or the defect classes of the rule-based classification, by use of the first and second likelihoods (see pg. 94, left column, first paragraph, after the learning procedure, a supervised learning method can then readjust the boundaries of classes like the supervised vector quantization algorithm); and

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classifying the defect by use of the third likelihoods (see pg. 94, left column, first paragraph, as a result, it could improve classification performance much better than the original LVQ algorithm; able to readjust class boundaries with prior knowledge in the classification procedure); and wherein the rule-based classification and learning type classification are present in a parallel relationship with each other and independent of each other (see pg. 94, left column, first paragraph; applied both an adaptive learning mechanism and a supervised learning technique to the LVQ algorithm. The adaptive learning mechanism can ... After the learning procedure, a supervised learning method can....; Examiner notes that the term parallel relationship is interpreted as a relationship between the two techniques where the execution/processing of the techniques do not coincide with each other as further clarified with the limitation, independent).

Regarding **claim 4**, Ko further discloses wherein the plurality of classes of the rule-based classification are selected from class sets (Ko: pg. 94, left column, first paragraph) displayed on a display screen (Ko: pg. 94, right column, last paragraph).

Regarding **claim 5**, Ko further discloses the third likelihoods are calculated of by using a classification model comprising a relation of the classes of the learning type classification and the classes of the rule-based classification (see pg. 94, left column, first paragraph).

Regarding **claim 26**, Ko discloses an apparatus for classifying defects, comprising: an imager which obtains an image of a defect on a sample (“three-color tiered illumination system ... CCD camera”; Ko: pg. 94, right column, last paragraph); a characteristic extractor which extracts a characteristic of the defect from the image (“classify solder joints by color patterns obtained from a three-tiered color circular illumination system

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based upon a similarity measure between input data and the feature vectors of each class"; Ko: pg. 94, left column, third paragraph);

a classifier which classifies the defect in accordance with the extracted characteristic, and based on a rule-based classification and a learning type classification (see pg. 94, left column, first paragraph), and

a display for displaying the image of the defect and the classification result on a screen (see pg. 94, right column, last paragraph);

wherein said classifying means comprises:

a rule-based classifier which calculates a set of first likelihoods of the defect belonging to each of plurality of rule classes by use of the characteristics of the defect (see pg. 94, left column, first paragraph, unsupervised self organizing neural network such as either a learning vector quantization (LVQ) neural network which is inherently rule-based since no classification algorithm can not operate or execute without rule-based),

a learning type classifier which calculates a set of second likelihoods of the defect belonging to each of a plurality of defect classes by use of the characteristic of the defect (see pg. 94, left column, first paragraph, adaptive learning mechanism can automatically select the optimal number of clusters during a learning procedure), and

calculator which calculates a set of third likelihoods of the defect belonging to each of said defect classes and/or rule classes, by use of the first and second likelihoods (see pg. 94, left column, first paragraph, after the learning procedure, a supervised learning method can then readjust the boundaries of classes like the supervised vector quantization algorithm), and

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a classifier which classifies the defects by use of the calculated third likelihoods (see pg. 94, left column, first paragraph, as a result, it could improve classification performance much better than the original LVQ algorithm; able to readjust class boundaries with prior knowledge in the classification procedure); and wherein the rule-based classification and learning type classification are present in a parallel relationship with each other and independent of each other (see pg. 94, left column, first paragraph; applied both an adaptive learning mechanism and a supervised learning technique to the LVQ algorithm. The adaptive learning mechanism can ... After the learning procedure, a supervised learning method can....; Examiner notes that the term parallel relationship is interpreted as a relationship between the two techniques where the execution/processing of the techniques do not coincide with each other as further clarified with the limitation, independent).

Regarding **claim 27**, Ko further discloses displaying a plurality of class sets on the screen, for selection of said rule classes (see pg. 94, right column, last paragraph; left column, first paragraph).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, “Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method”) in view of Henry et al (IEEE/SEMI, “Application of ADC Techniques to Characterize Yield-Limiting Defects Identified with the Overlay E-test/Inspection Data on Short Loop Process Testers).

Regarding **claim 2**, Ko discloses all elements as mentioned above in claim 1. Ko does not disclose wherein the image is an SEM image.

Henry, in the same field of endeavor, teaches wherein the image is an SEM image (“SEM images”; Henry: section 3, first paragraph)

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Ko to utilize an SEM image as taught by Henry, to allow for more detailed, enhanced images which would enhance the detection and classification of defects.

8. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, “Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method”) in view of Kikuchi et al (US 6,801,650 B1).

Regarding **claim 3**, Ko discloses all elements as mentioned above in claim 1. Ko does not disclose defect image is obtained while the sample is positioned in accordance with position coordinate data of the defects on the sample.

Kikuchi, in the same field of endeavor, teaches defect image is obtained while the sample is positioned in accordance with position coordinate data of the defects on the sample.

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(“defective position coordinate ... positions of defects on the semiconductor wafer”; Kikuchi: col. 17, lines 41-54).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Ko to utilize position coordinate data of the defects on the sample as taught by Kikuchi, to allow the “area of the semiconductor wafer under inspection [to be] in the field of view of the objective lens” (Kikuchi: col. 17, lines 41-54).

9. **Claims 6, 28, 29** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (IEEE, “Solder Joints Inspection Using a Neural Network and Fuzzy Rule-Based Classification Method”) in view of Xu et al (IEEE, Methods of Combining Multiple Classifiers and Their Applications to Handwriting Recognition)

Regarding **claim 6**, Ko discloses all elements as mentioned above in claim 5. Ko does not disclose generating a plurality of classification models; determining a likelihood of the adequacy of each classification model; and deciding a class likelihood according to the determined model likelihood.

Xu, in the same field of endeavor, teaches a plurality of classification models; determining a likelihood of the adequacy of each classification model; and deciding a class likelihood according to the determined model likelihood (Xu: page 421, left column, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Ko to calculate the likelihood of each classification class as taught by Xu, to improve the performance and reliability of individual classifiers.

Regarding **claims 28, 29**, Ko discloses all elements as mentioned above in claim 26. Ko does not disclose a computing section for calculating a likelihood of the adequacy of each of a plurality of classification models and classifies the defects by using said likelihood of the adequacy of the classification models; a computing section for calculating said third likelihood and a model likelihood of the adequacy of the individual classification models to decide a class likelihood according to the model likelihood.

Xu, in the same field of endeavor, teaches a computing section for calculating a likelihood of the adequacy of each of a plurality of classification models and classifies the defects by using said likelihood of the adequacy of the classification models; a computing section for calculating said third likelihood and a model likelihood of the adequacy of the individual classification models to decide a class likelihood according to the model likelihood (Xu: page 421, left column, lines 20-40).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Ko to calculate the likelihood of each classification class as taught by Xu, to improve the performance and reliability of individual classifiers.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on (571) 272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Edward Park
Examiner
Art Unit 2624

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/Brian Q Le/
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